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# REPORT ON POLLUTION OF INTERSTATE WATERS OF THE CONECUH - ESCAMBIA RIVER

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Cincinnati, Ohio

October 1962

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# REPORT ON POLLUTION OF INTERSTATE WATERS

of the

# CONECUH - ESCAMBIA RIVER

by

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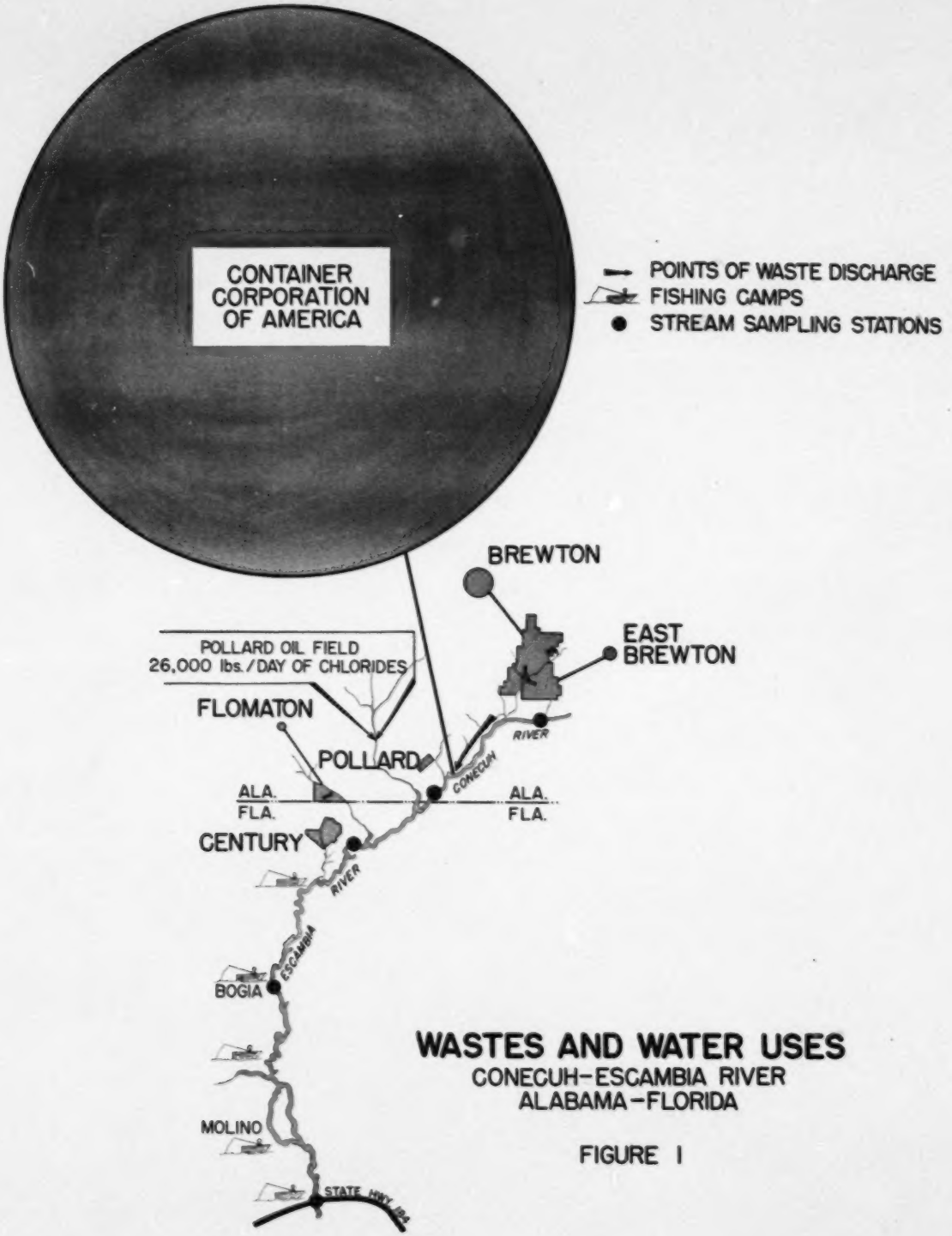
## INTRODUCTION

The Florida State Board of Health, the Florida water pollution control agency, on May 1, 1962, requested the Secretary of the Department of Health, Education, and Welfare to call a conference on alleged pollution of the Escambia River system between Alabama and Florida.

This report presents an evaluation of the available information on the reach of the Conecuh-Escambia River from Brewton, Alabama, to and below Century, Florida. This reach of the river is shown in Figure 1. The water quality and waste discharge data used in this investigation were provided by the States of Alabama and Florida and by the Container Corporation of America at Brewton, Alabama. Further information was obtained from a reconnaissance of the region by Public Health Service personnel and from the Public Health Service Water Quality Network station at Century, Florida.




**WASTES AND WATER USES**
CONECUH-ESCAMBIA RIVER
ALABAMA-FLORIDA

FIGURE 1

## THE AREA

### THE RIVER

The Conecuh River rises in the Eastern part of Alabama near the town of Union Springs. From there it flows generally Southwestward until it reaches the Florida State line between Brewton and Century. The river, known as the Escambia in Florida, then flows nearly due South until it empties into Escambia Bay approximately 45 miles from the Alabama State line. At century, Florida, near the State line, the drainage basin contains 3,817 square miles; at this point the river has a median 7-day low flow of 1,270 cubic feet per second (based on 16 years of record). The mean discharge is about 6,200 cubic feet per second and the lowest flow of record is 600 cubic feet per second.

The Conecuh and Escambia Rivers flow through densely wooded and sparsely inhabited areas for much of their lengths. Above Century the river is swift and relatively shallow, while below Century the velocity is decreased and the stream is generally deeper.

#### Sources of Waste

The Conecuh River above Brewton is free of any major source of

waste discharge for a distance of about 50 river miles. In the reach of the river from Brewton to the State line the Conecuh receives municipal wastes from Brewton, East Brewton, and Flomaton; industrial wastes from the T. R. Miller Company, a lumber mill and wood preservative plant in Brewton, and the Container Corporation of America pulp and paper mill at Brewton; and drainage from the Pollard Oil Field. These waste sources are shown in Figure 1 and Table 1.

All of the industrial wastes are subjected to treatment. The wastes from the Container Corporation of America plant, which is a bleached kraft pulp and paper mill, are discharged into a series of settling basins and natural ponds which provide about five days retention time before the waste effluent is discharged into the Conecuh River at a point about 3.5 miles above the State line. This treatment reduces the waste load discharged from 22,800 pounds per day of 5-day B.O.D. to an average of about 13,800 pounds per day.*

The T. R. Miller Lumber Company in Brewton discharges wood preservative wastes to ponds which may overflow to Murder Creek, a tributary of the Conecuh, in rainy periods. The quantity and chemical characteristics of these wastes are not known. The materials used in the wood preserving operations are creosote, Wolman salts, and pentachlorophenol; it may be assumed wastes reaching the Conecuh from this plant include some of these materials.

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* This is based on the average Taylor Hole Outlet B.O.D. of 77 mg/l and an estimated discharge volume of 21 M.G.D.

TABLE 1

SOURCES OF WASTE

| Source of Waste | Location (River Miles from Mouth) | Quantity of Waste | Type of Waste |
|---|---|---|---|
| Brewton | 54[1] | 4,000 P.E.* | Domestic Sewage |
| T. R. Miller Lumber Co. | 54[1] | Unknown | Wood Preservatives |
| E. Brewton | 54[1] | 1,600 P.E.* | Domestic Sewage |
| Container Corp. of America | 50 | 81,000 P.E.* | Kraft Paper Mill |
| Pollard Oil Field | 46[2] | 26,000 lbs. of chlorides per day | Brines |
| Flomaton | 45[3] | 1,200 P.E.* | Domestic Sewage |

* P.E. = 1 Population Equivalent = 0.17 lbs./day of 5-day B.O.D.

1 - Confluence of Murder Creek.

2 - Confluence of Little Escambia Creek.

3 - Confluence of Big Escambia Creek.

The estimated sewered populations in this reach of the Conecuh are: Brewton, 4,000; East Brewton, 1,600; and Flomaton, 1,200.

Drainage from the Pollard Oil Field includes brine as a major constituent. Waste brines are pumped to oil separators and then injected underground. It is estimated that about 26,000 pounds per day of chlorides reach the Conecuh River from this source.

## Water Uses

The Conecuh River below the Container Corporation of America is not used for municipal or industrial water supplies. Some Escambia River water is used as cooling water by industries near Escambia Bay. At present the river is not used as a source of municipal supply by Pensacola, Florida.

Water uses of the Escambia River are primarily recreational. There is some fishing and boating, as well as a small amount of swimming. In the river reach from the Alabama-Florida State line to the Florida Highway 184 there are seven commercial fishing camps having for hire a total of about 100 boats for sport fishing. It is estimated that there is an equal number of privately-owned fishing boats in the same part of the river. Fishing of the Escambia River is regarded as about average for this type of coastal stream. Continuing increases in the numbers of boats for hire at the fishing camps indicate that fishing on the Escambia is increasing.

## EFFECTS OF WASTE DISCHARGES ON WATER QUALITY

The Container Corporation of America began production at its Brewton plant late in 1957. Surveys of the Conecuh and Escambia Rivers were made by the Alabama Water Improvement Commission alone in 1956 and cooperatively with the Florida State Board of Health in 1958. Since that time the Conecuh and Escambia Rivers have been monitored routinely by the Container Corporation of America at three river stations:

1. Above Brewton (Hendley Bridge).
2. At Pollard.
3. At Century.

In addition to these studies, a biological survey of the river has been made annually since 1957 by the Institute of Paper Chemistry. In Table 2 are presented the total numbers of observations available at each of five stations on the Conecuh and Escambia Rivers in the reach examined in this study.

The samples were obtained at a wide variety of river discharge and temperature conditions but were concentrated in the high temperature and low river discharge seasons, i.e., late summer and autumn.

TABLE 2

SUMMARY OF NUMBERS OF OBSERVATIONS AVAILABLE
ON THE CONECUH AND ESCAMBIA RIVERS*

| Station | River Miles from Mouth | Total Number of Samples 1956-1957 | 1958-1961 |
|---|---|---|---|
| Brewton (Hendley Bridge), Ala. | 56 | 38 | 138 |
| Pollard, Ala. | 47 | 19 | 162 |
| Century, Fla. | 40.5 | 37 | 217 |
| Bogia, Fla. | 29.5 | 65 | 28 |
| Fla. Highway 184 | 10.5 | 72 | 28 |

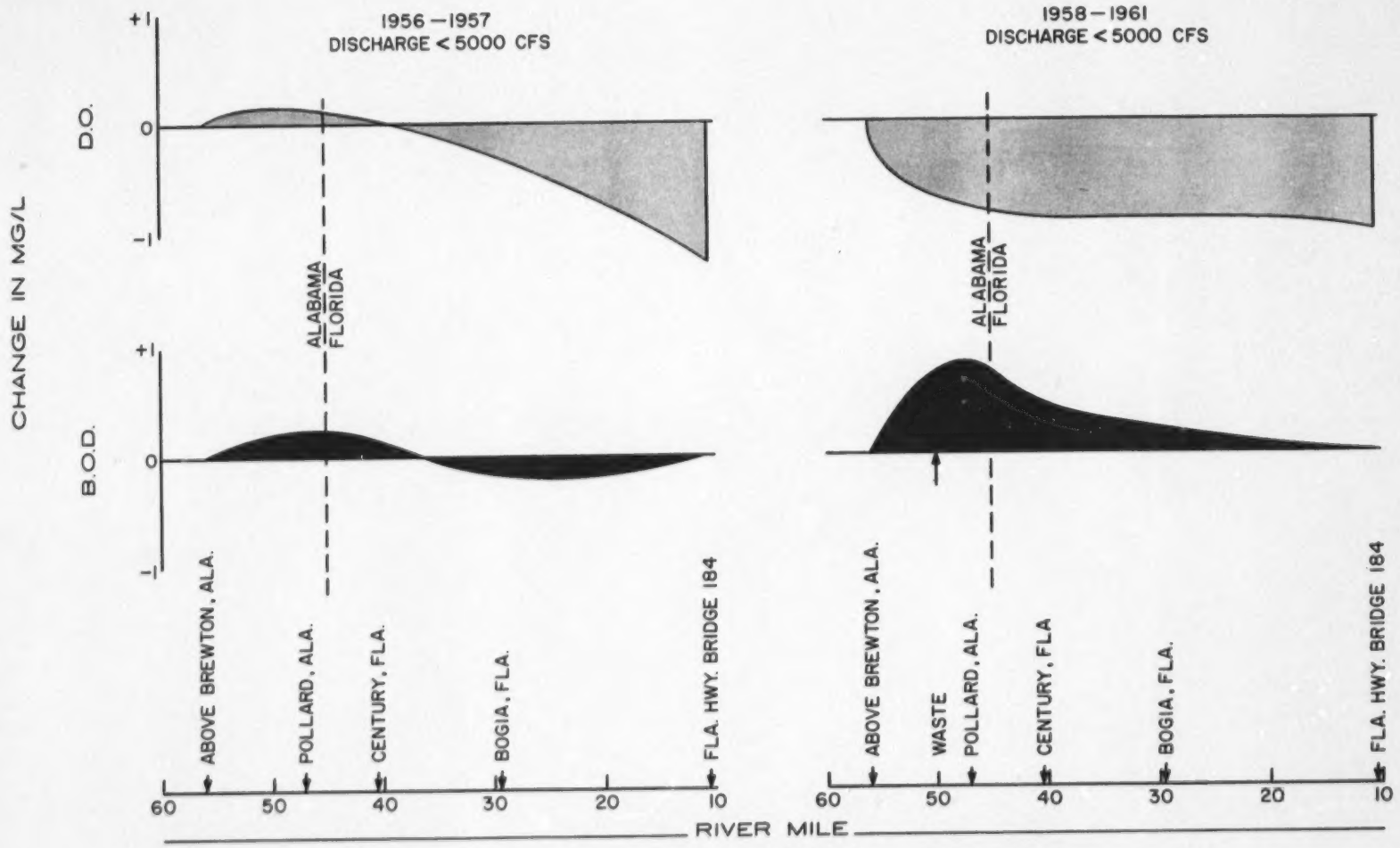
* These are numbers of samples on which Dissolved Oxygen determinations were made. B.O.D., pH, and Alkalinity determinations were made on approximately the same number of samples.

These data are considered adequate to characterize the average water quality of the Conecuh and Escambia Rivers from Brewton to and below Century, Florida, both before and after the Container Corporation of America began production.

The Hendley Bridge sampling station has been used as a control station in estimating the effects of waste discharges entering the river between Brewton and Century.

The available data were sorted into four discharge ranges (2,500, 2,500-4,990, 5,000-7,500, and 7,500 cfs) and four temperature ranges (13, 14-18, 19-24, and 25°C.). Comparisons of conditions at Hendley Bridge, Pollard, Century, Bogia, and the Florida 184 Bridge were made in each group for which data were available. The results of these comparisons are discussed here in terms of the change in each parameter from the values observed at the Hendley Bridge above Brewton. Changes in all parameters from Hendley Bridge to the downstream stations were found to be relatively independent of temperature, and the temperature classes for each discharge range were therefore averaged together to obtain the values used in this discussion.

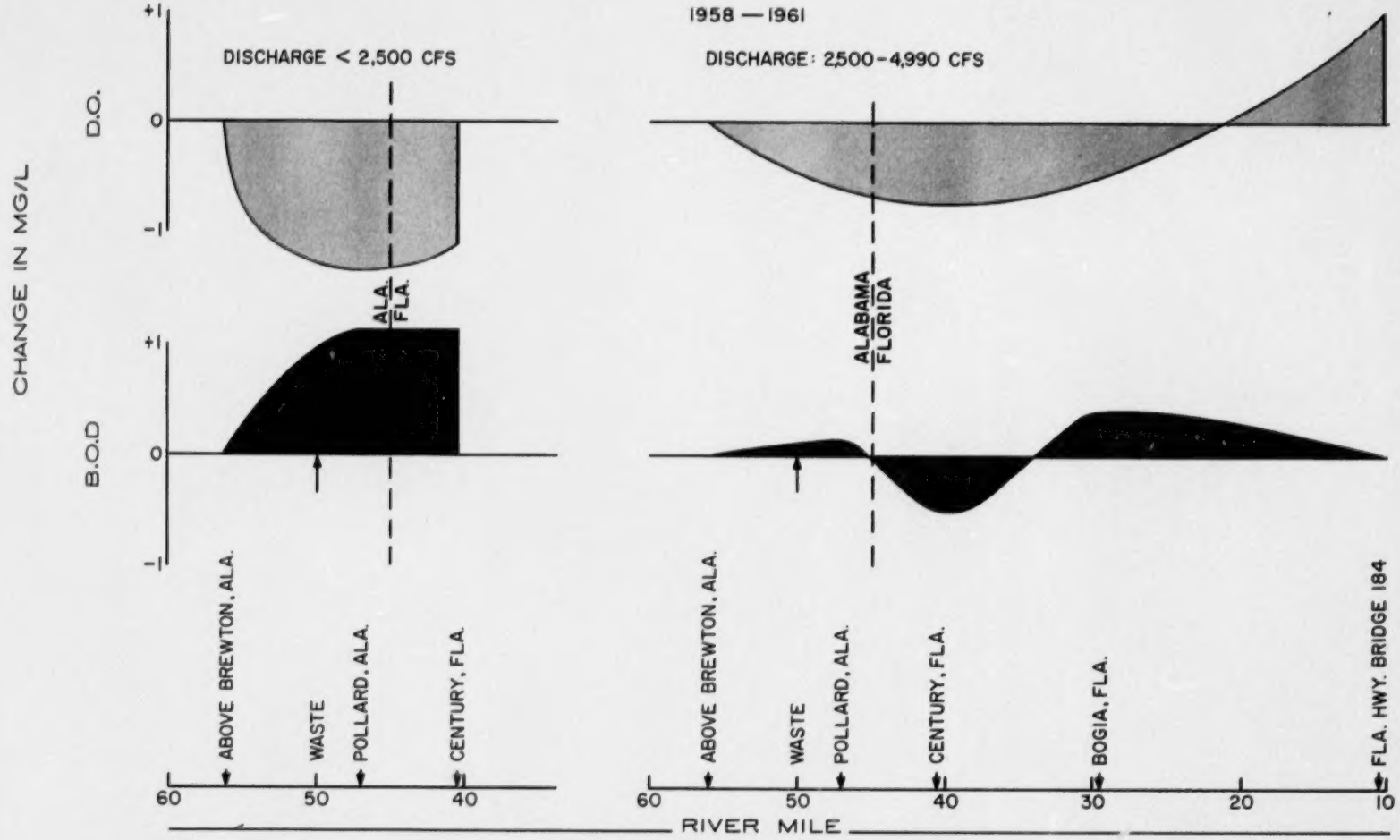
B.O.D. and D.O. changes for stream flows of less than 5,000 cfs at Century are presented in Figures 2 and 3. Figure 2 shows conditions before the Container Corporation of America plant began production. The slight increase in B.O.D. between Brewton and Century was about what would be expected from the quantity of municipal wastes discharged from Brewton and Flomaton. The change in D.O., which showed an increase at Pollard and




# CHANGES IN BOD AND DO BEFORE AND AFTER INSTALLATION OF CONTAINER CORP. OF AMERICA PLANT

CONECUH – ESCAMBIA RIVER
ALABAMA – FLORIDA

FIGURE 2




# CHANGES IN B.O.D. AND D.O. ATTRIBUTABLE TO CONTAINER CORP. OF AMERICA WASTE PLANT

CONECUH-ESCAMBIA RIVER
ALABAMA-FLORIDA

FIGURE 3

8-B

the same values at Century as were observed above Brewton, indicated that these wastes were a negligible burden on the waste assimilation capacity of the Escambia River. The decrease in D.O. and the lack of change in B.O.D. below Century probably reflected natural changes in the stream environment. pH decreased about 0.3 units from Brewton to the Florida 184 bridge, while total alkalinity decreased about 4 mg/l in the same reach. These changes were not significant.

Figures 2 and 3 illustrate changes in the D.O. and B.O.D. regime brought about by wastes from the Container Corporation of America plant. Figure 2 shows the average changes downstream from Brewton for river discharges less than 5,000 cfs at Century. The effects of the wastes are evident and of the magnitudes that would be predicted from the quantities of wastes discharged. There is an increase of B.O.D. of about 0.7 mg/l from Brewton to the State line and a corresponding decrease in D.O. of about 0.9 mg/l. The lack of change in D.O. and the small B.O.D. below this point indicate that the waste load is not causing an excessive demand on the organic waste assimilation capacity of the stream. The Alabama Water Improvement Commission consulted the Florida State Board of Health in establishing the requirements for waste disposal by the Container Corporation of America. The Florida State Board of Health requested that a D.O. of not less than 3.5 mg/l be permitted anywhere in the Escambia River and a D.O. after recovery of not less than 6.5 mg/l at the Chemstrand Corporation plant site. In terms of changes from the Hendley Bridge at summer-low flow conditions these requirements per a maximum drop of 4 mg/l

in the river and a drop of 1 mg/l to the Chemstrand Plant. The data show that these requirements are being exceeded.

In Figure 3 are presented the net changes in the D.O. and B.O.D. regime for two low river discharge ranges. The net changes reflect the effect of waste from the Container Corporation of America alone; these values are the differences between changes in D.O. and B.O.D. before the plant began operation and those after it began operation. At discharges less than 2,500 cfs data are available only for the Pollard and Century stations. There is an increase in B.O.D. of 1.1 mg/l to Pollard, and no change from Pollard to Century; the D.O. data show a drop of 1.3 mg/l from Brewton to Pollard and an increase of 0.2 mg/l from Pollard to Century. At discharges in the range of 2,500-4,990 cfs at Century the B.O.D. change downstream from Brewton fluctuates, lying between $\pm$ 0.5 mg/l of the value above Brewton. The D.O. decreases to Century as a result of this waste discharge, dropping to 0.7 mg/l less than the value above Brewton, and then rises in the lower reaches of the river.

The change in D.O. of 1.3 mg/l at discharges less than 2,500 cfs represents a drop in D.O. percent saturation to 80 percent at Pollard from 96 percent above Brewton for the highest temperatures (29°C.) reported in the data available. These conditions are the worst which may be expected to occur with present loadings.

The pH and total alkalinity changes are about the same after the Container Corporation of America plant began operation as they were before.

A U. S. Public Health Service Water Quality Network Station has been operating at Century, Florida, sinc 1960. Data available from this

station show that the quantities and types of organic materials present in the Escambia River at this point suggest a stream having a highly stabilized organic loading and very little industrial waste. The coliform data available for the Conecuh and Escambia River are far too sparse to show the extent of fecal pollution in the river. The five scattered coliform measurements reported for recent years have an average of 2,900 organisms per 100 ml. This value is not, however, regarded as conclusive because of the extremely small number of values upon which this average is based. While the extent of fecal pollution has not been measured adequately, the discharge of untreated municipal wastes poses a threat to bacterial quality of the river. Additional data on coliform densities should be obtained.

Chlorides in the Escambia River increase from 5 mg/l above Brewton to 14 mg/l at Century, probably due to drainage from the Pollard Oil Field. This increase does not represent a significant change in the water quality of the Escambia River.

Waste discharges may affect the aquatic life of a stream as well as the water quality. Biological surveys of the Escambia River have been conducted annually since 1957. The results of these surveys and a reconnaissance of the stream by a Public Health Service biologist indicates that wastes from the Container Corporation of America have had a detrimental effect on some of the benthic organisms of the stream. The variety and numbers of organisms sensitive to pollution have decreased since 1957 from Gay Lake (the point of discharge of Container Corporation of America wastes) downstream to the Alabama-Florida State line. Although five genera of sensitive forms were found in this area, only one individual of each

species was present in the collected sample. This represents a reduction from 6 to 25 individuals per species per sample in the upstream stations. Six species of immature mayflies were found at the station 50 yards upstream from the Gay Lake outfall, whereas one individual was found 200 yards downstream from the outfall, four species were found at Pollard, and two at Century Bridge. Immature caddisflies were similarly affected. Immature stoneflies were found at Mystic Springs. This represents the first occurrence downstream from the mouth of Gay Lake in 1962. From Century, Florida, downstream to Molino there was in 1962 a balanced biological population similar to that above Brewton. There is no evidence to suggest that the over-all changes in the benthic population from Gay Lake to Century have been accompanied by any change in the stream fishery.

Growths of Sphaerotilus were found from Gay Lake almost to Century in 1962; these growths have been found in this reach only since the Container Corporation of America began operation, and the growths have been found farther downstream each year since 1960, when their presence was first reported. The presence of Sphaerotilus, a filamentous sheathed bacterium, indicates that there are organic wastes being stabilized in the stream environment. When conditions favoring their growth exist, these bacterial slimes tend to dominate the environment and contribute to the dying out of the more sensitive organisms, thus causing an unbalanced biological complex. For this reason the presence of any quantity of Sphaerotilus at all is a source of concern about the potential health of the stream environment. The moderate amounts of the slimes observed up to present in the Conecuh and Escambia Rivers between Gay Lake and Century have not been associated

with serious damage to the aquatic environment; continuing observation of stream conditions and additional waste control measures, if needed, can prevent the development of these growths to the point at which they would constitute a damage to the aquatic environment.

Fish kills have been reported in the Conecuh and Escambia Rivers below Brewton. A severe kill in August 1961 was attributed by the Alabama Water Improvement Commission to a spill of wood preservative chemicals from the T. R. Miller Lumber Company in Brewton. Concurrently with this fish kill there was a heavy loss of the intolerant biota as far downstream as Molino, Florida. The biota have since recovered from this damage. A minor fish kill also was reported in 1961, but the cause has not been traced to a specific waste discharge.

Discussions with local boat camp operators and law enforcement officers indicate that the presence of the Container Corporation of America plant has had no detrimental effect on the sport fishery in the Escambia River above the Florida Highway 184 bridge. Fishing in the Century area has been generally better this year than the past two years; there are occasional complaints of unpleasant taste or odor in fish caught near the State line, but these reports are relatively infrequent. Below Century the boat camp operators interviewed described business and fishing in recent years as good and report no complaints of taste or odor in fish caught in this reach of the river.

Moderate effects of waste discharges from sources in Alabama on the water quality of the Conecuh and Escambia Rivers are reflected in the available data. There are effects at all times for which data are available

on the chemical water quality and on the biological environment of the Escambia River which extend beyond the Florida-Alabama State line. The effects, however, do not exceed those that may be detected downstream from any waste discharge for which adequate treatment and control have been provided. In addition to these constant effects of the waste discharges there has been at least one spill of waste materials which had catastrophic effects on the biological environment. Bacteriological examinations have been insufficient to reveal whether excessive bacterial contamination from the untreated sewage discharges of Brewton, East Brewton, and Flomaton persists to the Alabama-Florida State line.

The uses of the Escambia River in Florida are primarily for recreation and for industrial cooling water. Available data (other than bacteriological) indicate that the present over-all change in water quality from sources of waste in Alabama is not sufficient to endanger the use of the river for either of these purposes. There has been occasional damage to recreational uses, presumably caused by releases of materials lethal to fish and to the organisms upon which they feed. Such releases can and should be controlled. Additional bacteriological examination is needed to determine whether untreated sewage causes excessive interstate bacterial contamination.

## CONCLUSIONS AND RECOMMENDATIONS

The effects on water quality in the Conecuh and Escambia Rivers due to wastes entering the stream in Alabama are apparent but not excessive. The net loss of 1.3 mg/l of Dissolved Oxygen, which results in a minimum D.O. concentration of about 80 percent of saturation at summer temperatures, does not appear to interfere significantly with legitimate water uses of the Escambia River in Florida. The data available indicate that discharge of these wastes to the Escambia River has not up to the present time had any permanently damaging effects on the uses of the Escambia for recreation and industrial water supply.

Because of the occasional fish kills that have occurred in the past, the reports of unpleasant taste and odor in fish, and the progression of Sphaerotilus growths downstream, these recommendations are made:

1. The biological surveys and routine monitoring of water quality should be continued and the emphasis on conditions at low flow and high temperatures should be maintained. If excessive Sphaerotilus growths should develop steps should be taken for control by Container Corporation of America.
2. Special emphasis should be placed on the prevention of spills of toxic or lethal materials into the aquatic environment from all waste sources at the T. R. Miller Lumber Company wood preservation plant.
3. Sewage treatment should be provided for municipal wastes from Brewton, East Brewton, and Flomaton to eliminate local pollution and possibility of excessive interstate bacterial contamination. A grant for the construction of a sewage treatment plant for Brewton and East Brewton should alleviate part of this problem.